Ownership Form Effect on Large-Scale Farms' Performance: Case of Czech Agriculture

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Abstract

This study analyzes the ownership-performance relationship in large-scale farms using extensive survey and farm accountancy data from Czech agriculture. Controlling for ownership endogeneity, no significant influence of ownership on financial performance was found. However, ownership concentration and managerial ownership positively effect labor productivity. Farm group analysis detects highly heterogeneous ownership form combinations and suggests that ownership endogeneity stems from mutual sources with economic performance. The results imply that one of these sources is management quality and its ownership transformation strategies. They further disclose that ownership structure and agency problems are more of a concern in larger farms.

Keywords

Cluster analysis, Czech agriculture, ownership, endogeneity, large-scale farms, performance, principal component analysis.

1 INTRODUCTION

The European Union's (EU) May 2004 enlargement brought with it an increase of large-scale farms' representation in the EU agricultural structures. Large-scale farming is not characteristic in all new member states, however, in some it has retained its significant representation and importance in the agricultural sectors. The large-scale farms in these countries have been analyzed in various contexts, such as efficiency and economic growth (e.g. Latruff et al. 2005, Curtiss 2002) or structural changes and property rights development (e.g. Schlüter 2001, Brem 2000). In the context of efficiency and economic advantage, large-scale farms have been mostly empirically analyzed in comparison to smaller family type farms, or their size and legal form efficiency effects have been discussed. Not only do theoretical contradictions predominate the literature, but the empirical analyses also have not brought forth unique conclusions about the large-scale farms' economic advantages or disadvantages. This could be a consequence of the fact that differences between the large-scale farms are much more far-reaching than implied by their often analyzed legal forms. Deeper and more detailed analysis is called for to understand possible future farm structure development in the new model of EU agriculture.

Theoretical discussions, e.g. by Beckmann (2000), consider, in addition to various legal forms, possible economic advantages and disadvantages of hierarchical, flat and other organizational forms suitable for agricultural production. However, considering the marked heterogeneity of emerging ownership structures in transition countries makes the theoretical discourse more complicated and places greater importance on empirical studies. The wide variety of ownership configurations in transition economies has been viewed as a unique opportunity by many researchers. The large set of empirical studies which consider ownership form performance relationships and the factors of ownership structure development in more detail, however, do not consider agriculture in particular. For example, Estrin and Angelucci (2003) in their analysis of Russian firms did not identify obvious differences in performance between insider- and outsider-owned firms, while Frydman et al. (1999) found that for 10 Central European countries, outsider owners outperform insiders. Jones and Mygind (2000) found evidence from Estonia that manager-owned firms display better performance than employee-owned firms, although employee-owned firms do not grossly underperform. Also in Estonia, Kalmi and Mygind (2003) showed, based on their 12 case studies, that ownership change, for example from employee ownership to manager ownership, speeds up restructuring and is thus viewed as efficient. Jones et al. (2003) conclude that managers gain their ownership stakes by means of their information advantages and hierarchical positions over employees. Still, their findings support the notion that this is largely a result of efficiency concerns and leads them to the conclusion that a rapid decline in employee ownership can be expected. Their empirical findings are in accordance with the view that efficiency considerations drive ownership changes, which is not consistent with findings by Schlüter (2001) and Milczarek (2002), who for the case of Czech and Polish agriculture, respectively, state that ownership changes are mostly the result of some agents', especially managers', bargaining power and opportunism.

The privatization processes in Czech agriculture have resulted in the development of diverse ownership structures, especially since approximately 70% of agricultural land remains cultivated by large-scale farms of various legal forms. The prevalent trait of this ownership structure is that, aside from being very fragmented, it is associated with high discrepancies between ownership and capital use. This implies a low ownership concentration and a high share of external (investor) ownership. Another interesting distinction is the high level of employee ownership, which has undergone significant changes during transition due to the emerging trade with property rights. As cited by Chaplin et al. (2000), the Czech Statistical Office (CzSO 2001) shows that the share of hired workers (including managers) having no capital stock in farms in agricultural labor has increased since 1995 (from 38% in 1995 to 66% in 2001). From the owners' perspective, the working members and shareholders of co-operatives and joint stock companies represented 20% of agricultural labor in 2001 (Chaplin et al. 2000). These developing ownership structures are interesting farm features related to agency problems, which possibly contribute to explaining a farm economic success or failure. The case of Czech agriculture, with its distinct degrees of ownership concentration, investor and employee ownership, and also managerial ownership, provides a particularly interesting compass for an empirical analysis.

The objective of this study is to empirically analyze the ownership structures in Czech agriculture and the ownership-performance relationship. We collected ownership structure data for 2003, as well as data on restructuring processes in the farms, and combined these with farm accountancy data for 2002 and 2003. We select four ownership characteristics – ownership concentration, investor, employee and managerial ownership – and analyze their effect on performance as represented by profitability and productivity indicators. We test and control for endogeneity of ownership structure, since it has been the subject of a controversy in the literature introduced by Demsetz (1983) and Demsetz and Lehn (1985). Using principal component and cluster analysis, we detect significantly different groups of similar enterprises with respect to ownership structure, farm development and performance. This is motivated by the possibility of the simultaneous occurrence of chosen ownership characteristics on one farm and their different developmental paths which could not be captured by the performance model. By means of these analyses of the data unique in its detail, this study should contribute to the better understanding of large-scale farm performance heterogeneity and ownership form role in future structural changes in Czech agriculture.

2 DEBATE ON OWNERSHIP-PERFORMANCE RELATIONSHIP

The ownership structure relationship to firm performance has received much attention in theoretical and empirical research since Berle and Means (1932/1967) formulated the agency problem, which stems from the separation of ownership and control. In the context of transition, this relationship became a relevant research problem not at the moment when property rights were politically (mostly sub-optimally) restored, but when they became a subject of free trade. Keeping with the Coase theorem (Coase, 1960), the free ownership shares market was expected to lead to efficiency-enhancing ownership change. One of the reasons why the ownership market should select the more efficient ownership configuration is because of the opportunities for mutually beneficial transactions: more efficient owners who are able to create more value would buy shares from less-efficient owners (Jensen and Meckling 1976, Demsetz and Lehn 1985, Hansmann 1996). Furthermore, product market competition should force inefficient firms, for which the costs of ownership are high, out of the market or to sell equity to other investors (Jones et al. 2003).

There are various characteristics of ownership related to the location of ownership rights within the firm: rights held primarily by investors, consumers, employees, some sub-categories of these groups or their combination (Ricketts 2003). As indicated above, the ownership reforms in transition economies created convenient conditions for the formation, but not stabilization, of employee ownership. Dow (2003) describes the advantages of employee ownership as incentive optimism and its disadvantages as finance pessimism. That is, employee ownership should align the incentives of insiders with the companies' performance; on the other hand, employees as owners are more risk-averse and have consumption time preferences, which reduce the investment activity of the business. The incentive effect is further considered as more important in more labor-intensive productions (Jones and Kato 1993) however, it decreases with the size of the company as a result of the high cost of collective decision-making (Hansmann 1996). This also supports Alchian and Demsetz's (1972) argument that managerial ownership, which reduces the degree of collective decision-making, becomes more favorable with the increase of a company's size.

Since employee ownership is not expected to be stable in transition agriculture, we are interested in the direction of ownership changes and their efficiency implication. One theoretical thesis posits that successful employee-owned firms are more likely to convert into conventional ownership structures, because departing employees are more likely to get a good return from selling shares to outside investors (e.g. Miyazaki, 1984). However, if we consider transition specifics such as the large number of employee-owners and their higher interest in departing due to high age and liquidity constrains, the lower attraction of agriculture due to its high indebtedness, financial problems and elimination of state support, managers' low alternative employment options and knowledge of the economic situation of the companies, we rather hypothesize that more successful agricultural enterprises are expected to have a more concentrated and managerial ownership structure with lower investor ownership.

This hypothesis is also supported by the statement by Wright et al. (2001), who state that management buy-outs often occur in order to solve agency problems between managers and owners, which can be a problem in the transitional agricultural sector due to the high representation of large-scale and cooperative farming. They also argue that management buy-outs happen when ownership share prices are lower than the managements' subjective valuation of the firms' managers, which is often the case in better companies. Management can better detect successes when compared to (other) owners and can influence the price of shares. On the other hand, a poorly-performing firm will not be attractive to managers and may have to turn to investors out of necessity, (Jones et al. 2003) which does not solve possible agency problems. Considering these arguments, we set another hypothesis for the Czech case: that underperforming companies had greater difficulties settling the transformation claims of eligible persons, and in order to survive, they had to convince the persons entitled to their equity to capitalize their shares and thus become investors in the company. Therefore, companies with a higher share of investor ownership are expected to be less well-performing.

As the above discussion suggests, the causality in the ownership-performance relationship and the problem of endogeneity is seldom addressed. Demsetz (1983) and Demsetz and Lehn (1985) questioned the effect of ownership on performance and initiated the ownership endogeneity discussion when they illustrated that ownership is endogenously determined to reach a trade-of between several costs advantages and disadvantages in the firm. Some empirical studies have followed these concerns and found ambiguous results. Studies finding ownership structure endogeneity (e.g. Demsetz and Villalonga 2001, Himmelberg et al. 1999) showed that it can have two different sources, simultaneity between ownership and performance or individual firm heterogeneity, which affects both firm performance and ownership structure. Since this study will take the possible endogeneity problem into account, possible factors of ownership endogeneity are discussed in more detail in the context of variables choice in Section 4.

3 TRANSFORMATION OF OWNERSHIP RIGHTS IN CZECH AGRICULTURE

This section should illuminate the ownership structures development in Czech agriculture, the reasons for large-scale farm survival and transformation strategies leading to the farms' ownership form variability.

The communist regime of 1948 – 1989 introduced a socialistic form of farming represented by state and collective farms[2]. This led to the creation of large-scale farms with aspects of industrialization and intensification, which accounted for almost all farm output (OECD 1995). At the beginning of transition collective farms played the dominant role in Czech agriculture. Collective farms operated on 62% of the total agricultural land and accounted for almost 70% of agricultural production. Second in importance were state farms, which occupied 37% of the total agricultural land and produced 29% of agricultural production. The 3,205 small farmers who were able to keep their effective property rights had less than 1% of the total agricultural land and production.

Contemporary farm structure in the Czech Republic is a consequence of extensive restructuring, which was initiated by privatisation and the introduction of new commercial law. The privatisation process started in 1990-91 with the *restitution* of expropriated and collectivized assets and land. The second form of privatization was *transformation,* which referred to the redistribution of assets of collective farms accumulated after collectivisation. Transformation of cooperatives was, for the largest part, carried out from 1992 to 1993. The third form of *privatization* was the sale of state assets (1994-95). Restitutions restored land ownership of about 70 – 75% of the total agricultural land. The remaining land was state owned and was excluded from privatisation until 2000). The agricultural assets were privatized by respective privatisation forms by almost 100%. The intention of reforms was to individualize property rights and correct former injustices (Ratinger, Rabinowicz 1997). As a result, the reforms created a very fragmented ownership structure, with about 3.5 million landowners on an average land property of 1 hectare, and roughly the same number of claims to non-land assets.

In the initial stage of transition prior to 1995, the total area cultivated by individual private farmers (IPF) expanded rapidly. It achieved more than 23% in agricultural land use, but did not achieve the expected extent. Large corporate farms have kept their important role in the sector (Lerman et al. 2002) in spite of earlier considerable support by irrevocable loans, which were later changed into interest free loans. The unfulfilled expectations could be explained by the following arguments: owners' specialisation in non-agricultural jobs; problems with the identification of plots in terrain; access to land and limited divisibility of non-land assets; rather small individual property shares and land plots for establishing commercial farms, and; the defensive position of a conservative rural population to a risky agrarian business (Divila 2001, Ratinger, Rabinowicz 1997, Curtiss et al. 2003). After 1995, new entrants occurred only in a limited number. The growing share of IPF land was caused rather by slowly increasing size. For example, between 1995 and 2003, the average individual farm size of the category of farms over 100 hectares increased by 15% (CzSO 1996, 2004).

In the case of corporate farms, the number of cooperatives slowly increased during the first stage of transition in comparison with the pre-transition time. However, the cooperatives' average area decreased by 45%, to 1,450 hectares, caused by the application of the Transformation Act, which called for obligatory transformation. Less than 10% of former collective farms were transformed directly into other business forms; nearly 2% of them were liquidated and the rest transformed into cooperatives (Chloupková 2001). Newly-emerged cooperatives were often divided into other types of cooperatives, mostly because of local interests such as better land location, re-distribution of specializations within the cooperative, etc. Cooperatives could be also split into two or more companies, so that one part was constituted by member shares allocated in that cooperative and the other one was to be used for non-members' claim settlements and thus, consequently, to go bankrupt.

Two other new organisational forms emerged; Joint Stock Companies (JSC) and Limited Liability Companies (LLC). The earlier-established JSC mostly originated from voucher privatisation of state farms, while LLC were mostly established by means of state farms' non-land assets sales in tenders. LLC were also established by larger restituents, who were often led by former managers of cooperative or state farms, and/or the dividing of transformed cooperatives, or later by the merger of individual farmers.

The most notable shift in the corporate sector between cooperatives and JSC was in the second phase of restructuring (after 1995). This relates to the problem that successors of collective farms had to deal with claims on assets by non-farming heirs of original owners, so-called "eligible persons" that were not members of cooperatives. These transformation claims were frozen until the end of 1999, when they became real liabilities, mostly to cooperatives. Since there has not been enough profit generated in cooperatives, monetary compensation has happened only rarely. Capitalisation of claims in a form of (non-tradable) co-operative membership suffers from the problem of future (monetary) withdrawal (Divila 2003) and these eligible persons insisted on compensation. Therefore, a transfer of restitution claims into "tradable" shares of JSC has been regarded as a pragmatic option. Divila (2003) suggests that a few hundred cooperatives (about 60%) used this manner of claims composition with eligible persons. This process has led to more fragmented ownership of the newly-established JSC, but "tradable shares" could lead to more concentrated ownership. The future of cooperatives which have not yet settled their transformation claims is still not legally clarified and their existence is in danger from the side of eligible persons, that is, non-members.

In reality, the ways in which agricultural organizations could be set up were tremendously heterogeneous and to some extent complicated. The vague Transformation Act, which was supposed to remedy the injustices in property rights, amendments in that and related Acts, and the frequent helplessness of executive and legislative bodies have all contributed to weak transparency and a complicated organizational setting. Another less-discussed issue which influenced the structural development of Czech agriculture was the fact that companies established from state farms were obliged to settle privatisation debts, as were co-operatives, but in the first case debts were partly forgiven. This all suggests that farm restructuring, especially in the initial stage of transformation, was affected by a highly politicized privatisation process; therefore, the established farm structures were unlikely to be economically optimal. However, as the discussion also showed, later changes occurred

due to ownership trade, which could suggest the establishment of conditions for creating ownership structures based on efficiency principle. These are the subject of the following empirical analysis.

4 METHODOLOGY AND DATA

The empirical analysis consists of two parts. First, the relationship between selected performance indicators and ownership structure is analyzed in a regression model using instrumental variables which allow to control for the endogeneity problem. We assume the endogeneity problem originates in the simultaneity of the performance and ownership form variables. In the second part, multivariate data analyses, concrete principle component and cluster analyses are used to detect existing groups of enterprises that significantly vary in their ownership structures, their transformation strategy and performances[3].

The endogeneity problem in regressions occurs when an error term is correlated with an explanatory variable, which, as discussed in the literature, is likely to be the case of the performance ownership relationship (see discussion above). We use a Two-Stage Least Square (2SLS) estimation procedure that eliminates this problem and provides unbiased estimates. The performance model is defined as follows:

(1) $$Y_i = \alpha + \beta_k X_{ik} + \gamma_l Z_{il} + \varepsilon_i$$

instruments Z_{il} and S_{im}.

where Y is a performance indicator; X_k is an *1xk* vector of ownership form variables; Z_l is an *1xl* vector of variables that are correlated with both X and the error term ε, while S_m is an *1xm* vector of variables correlated only with X; the i subscript at each variable represents ith for which the variables are observed, and α, β, γ as well as the below-presented δ and θ are parameters to be estimated. Using the 2SLS, we first run Ordinary Least Square (OLS) regression

(2) $$X_{ik} = \lambda + \delta_l Z_{il} + \theta_m S_{im} + \mu_i$$

and obtain predicted X values

(3) $$\hat{X}_{ik} = \hat{\lambda} + \hat{\delta}_l Z_{il} + \hat{\theta}_m S_{im}$$

Using this procedure, the ownership variable X is decomposed into a part that is uncorrelated with the random term ε and part correlated with ε. In the second step, we run OLS regression using $\hat{X}_{ik}$

(4) $$Y_i = \alpha + \beta_k \hat{X}_{ik} + \gamma_l Z_{il} + \varepsilon_i^*$$

The component of X that was correlated with ε moved into the error and a new error term ε^* enters the equation. The other part of X that was uncorrelated with ε stays as an explanatory variable. The instruments thus isolate the covariation between y_i and x_i; hence, the endogeneity problem is controlled. Estimated parameters β indicate the real effect of ownership on performance not caused by joint explanatory variables.

Ownership structure and further farm characteristic data utilized in this paper were collected in the Czech Republic in 2004. This extensive data survey was organized by the Institute for Agricultural Development in Central and Eastern Europe (IAMO) and by the Research Institute for Agricultural Economics in Prague (VUZE). The ownership data, unique in its detail, was extended by data from the Czech Farm Accountancy Data Network for the years 2002 and 2003. These served for the derivation of financial analysis and productivity indicators. The sample consists of data on 166 agricultural enterprises with legal entity status. They include 87 cooperatives, 57 JSC and 22 LLC. This configuration reflects the farms' willingness to cooperate with data collection rather than the farm structure in Czech agriculture described in Section 3. The firms in the sample can be mostly classified

as farms with combined crop and animal production, whereas they differ significantly in their size and crop/animal production proportions.

The ownership form effect on farms' performance is analyzed by pooling two year unbalanced panel data. Farms were eliminated from the analysis for which missing values of included variables occurred. The model includes 222 observations (i = 1,2…, N; N = 222); 113 for the year 2002 and 109 for 2003. The model is estimated separately for three different performance indicators (Y_i). The first two parameters relate to farm profitability. We use Return on Assets (PROFIT1) which represents the Gross Farm Surplus[4] generated from agricultural and non-agricultural activities, including operational subsidies[5] divided by total assets. The second profitability indicator (PROFIT2) is also a Return on Assets indicator, with the only difference being that operational subsidies get subtracted from Gross Farm Surplus. The last endogenous variable used in the analysis is labor productivity (LABORPROD) defined as total revenues from agricultural and non-agricultural production, divided by total working hours.

The explanatory variables, X_{ik}, are represented by four ownership structure variables. Due to the correlation between some of them, two in three combinations are used in separate performance models (k = 2). Hence, the total number of estimated models when using three different endogenous variables is nine (see Table 1). The ownership structure is proxied by ownership concentration (CAPCONC) represented by capital stock per owner, external ownership (EXTEROWN) as given by the share of employed owners in the agricultural company to the total number of owners, employee ownership (EMPLOWN) defined as the share of employed owners to total number of employees, and managerial ownership (MANOWN) as a dummy variable, where 1 indicates if managers own higher shares of the company, and 0 if managers own the same or smaller shares compared to other owners.

The vector of Z_{il} variables includes six variables that are expected to explain ownership structure as well as performance level, and may thus be a potential source of endogeneity (l = 6). There are exogenous as well as instrumental variables in the performance model. Director's age and education (DIRAGE and DIREDUC, respectively) and management members' average age (MANAGAGE) are characteristics which are, in transition conditions, expected to influence ownership form choice. This is supported, for example, by the study by Schlüter (2001), who pointed out that privatization in Czech agriculture was strongly influenced by former managers' bargaining power and managers' strong information asymmetries. At the same time, these variables are associated with management quality and the level of risk-aversion, which can influence the farm performance, and therefore are often included in farm efficiency analysis (e.g. Mathijs and Vranken 2001).

Other variables included in the model that are expected to affect both ownership and performance are farm size (SIZE), the level of liquidity (LIQUIDITY) and farm indebtedness (DEBT). A larger farm size, defined here as total capital utilized by the company, is expected to relate to lower ownership concentration. Demsetz and Lehn (1985) state that the larger the firm and its capital resources, the more difficult it is to own a given fraction of the firm. Simultaneously, size can have a direct effect on farm performance through the dispersion of fixed costs. Farm liquidity is represented by quick ratio, which is equal to current assets minus inventory and uncollectible receivables, divided by current liabilities. Indebtedness is measured by the ratio of total farm liabilities to total assets. Similar to Himmelberg et al. (1999) who discussed the effect of intangible assets and market power, we argue that farm lower liquidity and higher indebtedness increase the company's values, leverage, adaptability and riskiness, and leads to higher levels of insider ownership so as to align incentives and to control for managerial discretion.

The last group of variables, S_{im}, represents four variables that are expected to influence the ownership structure only, and which are included in the performance model only as instrumental variables (m = 4). The first two variables, involvement of the company in local cultural activities (CULTACT) and workers' employment due to social reasons (SOCEMPL) are variables which should express the strength of path-dependencies and their effect on ownership choice in the region. Production specialization (SPEC) is given by the share of revenues from crop production to the total revenues from agricultural production. It is, due to location allegiance and the limited financial resources during transition, viewed as semi-fixed over time, so that adjustment in ownership and organization are expected more than significant changes in production specialization. Through the

ability to adjust the ownership structure efficiently to the inherited specialization in transition, specialization can affect farm performance. The last variable in the performance model concerns the work alternatives for the workers of a farm (WORKALTERN). This should reflect the general conditions of the persons eligible for transformation claims (ownership shares) under which they decided about their ownership involvement in the then-transforming agriculture. Better work opportunities outside of agriculture are expected to decrease the eligible persons' interest in external ownership. In an opposite situation, employee ownership in agricultural companies may be seen as an attempt to save jobs and maintain social stability (e.g. Earle and Estrin 1996).

Variables that are further used in the principle component analysis should help to understand the ownership structure and their development in more detail. These are the age of the company (COMPAGE), its legal form (COOP) which indicates if the company is a cooperative or another form, a variable representing whether the current company is a successor of a whole company which functioned during socialism or took over only a part (PART), the share of owners among managers (OWNMANSH), the intention to decrease the number of owners (OWNDECR), voting system (VOTING) which is a variable for democratic voting (one owner, one voice) or a share-reflecting voting system, and tree variables as proxies for principal-agent problems – disputes between the owners and managers (MANOWNDISP), degree of owners' engagement in company matters (OWNENGM), and problems with employees' work ethic (MORALPROB). The component analysis also considers three additional capital structure variables – the degree of capital depreciation (DEPREC), degree of indebtedness from transformation claims (TRANSFDEBT), and bank loan indebtedness (CREDDEBT) - and variable for investment activity (INVACT) represented by the share of investment on total assets.

5 RESULTS

The empirical analysis shows ambiguous results with regard to the effect of farm ownership form on performance. Tests of endogeneity confirmed the existence of this problem, thus choosing the 2SLS estimation procedure proved relevant. The performance model estimates are presented in Table 1. Controlling for endogeneity, most results suggest an insignificant ownership effect on Czech farms' performance, implying that both might be determined by the same factors. Only Models 3, 7 and 9 show a significant influence of ownership on farm performance; these are, however, sensitive to the performance and ownership form measures. Estimates in Model 3 imply that a higher share of managerial ownership has a negative effect on farm Return on Assets when calculated from Gross Farm Surplus including operational subsidies, while results from Model 9 indicate that managerial ownership has a positive effect on labor productivity. These contrary results suggest that managers' higher ownership shares could improve the decision-making in the company and increase managers incentives, which would lead to higher productivity. A deeper analysis of the managerial ownership correlations with other farm specifics disclosed that the found ownership effect could be a result of related improvement of voting system which is derived from the owners equity shares, and a higher share of settled transformation debts. Comparing Models 3 and 6 suggests that companies with higher managerial ownership are acquiring lesser operational subsidies. Model 7 further shows that ownership concentration significantly improves the company's productivity, but is not proved to influence the financial indicators of profitability.

TABLE 1 Two-Stage Least Square Regression Estimates for the Profitability-Ownership Relationship

Y = PROFIT1	Model 1		Model 2		Model 3	
X	Param.	St. dev.	Param.	St. dev.	Param.	St. dev.
CAPCONC	-0.002	0.002	-0.002	0.002	-0.002	0.002
EXTERNOWN	8.578	5.716	-	-	-	-
EMPLOWN	-	-	2.878	9.012	-	-
MANOWN	-	-	-	-	-5.049*	3.076
DIRAGE	0.086*	0.049	0.048	0.090	0.051	0.055
MANAGAGE	-0.145	0.102	-0.334***	0.096	-0.159*	0.089
DIREDUC	-0.077	0.721	-0.373	0.903	0.299	0.760
SIZE	0.006	0.004	0.000	0.008	0.004	0.004
LIQUIDITY	0.396	0.373	0.197	0.476	0.616	0.390
DEBT	-0.044	0.028	-0.014	0.024	-0.021	0.023
Constant	6.691	6.391	19.898***	6.497	11.180**	5.553
Y = PROFIT2	Model 4		Model 5		Model 6	
X	Param.	St. dev.	Param.	St. dev.	Param.	St. dev.
CAPCONC	0.003	0.003	0.003	0.004	0.000	0.003
EXTERNOWN	-0.933	6.933	-	-	-	-
EMPLOWN	-	-	-19.747	14.269	-	-
MANOWN	-	-	-	-	-4.390	3.414
DIRAGE	0.091	0.059	0.224	0.143	0.075	0.061
MANAGAGE	-0.137	0.124	-0.091	0.152	-0.102	0.098
DIREDUC	1.302	0.875	1.749	1.430	1.601*	0.843
SIZE	0.015***	0.005	0.029**	0.001	0.013***	0.004
LIQUIDITY	0.756*	0.453	1.312*	0.754	0.803*	0.432
DEBT	-0.026	0.034	-0.060	0.038	-0.043*	0.026
Constant	-3.609	7.752	-4.233	10.288	-2.286	6.162
Y = LABORPROD	Model 7		Model 8		Model 9	
X	Param.	St. dev.	Param.	St. dev.	Param.	St. dev.
CAPCONC	0.0001*	0.0001	0.000	0.000	0.000	0.000
EXTERNOWN	-0.286	0.199	-	-	-	-
EMPLOWN	-	-	-0.008	0.221	-	-
MANOWN	-	-	-	-	0.191**	0.085
DIRAGE	-0.001	0.002	-0.001	0.002	-0.002	0.002
MANAGAGE	-0.004	0.004	-0.002	0.002	-0.002	0.002
DIREDUC	0.022	0.025	0.031	0.022	0.015	0.021
SIZE	0.000	0.000	0.000	0.000	0.000	0.000
LIQUIDITY	0.009	0.013	0.012	0.012	0.012	0.011
DEBT	0.000	0.001	-0.001	0.001	0.000	0.001
Constant	0.765***	0.222	0.518***	0.159	0.526***	0.153

*, **, and *** indicate significance at the 10%, 5% and 1% significance level, respectively.

The other parameters in the PROFIT1 model in Table 1 imply that director's age improves the farm Return on Assets when calculated from Gross Farm Surplus including operational subsidies, which could relate to the older directors' networking in various forms of associations. On the other hand, the average age of other management members has a negative effect on profitability implying that higher managers' age decreases the human capital of the company. However, when estimating the effect of ownership on PROFIT2 as Return on Assets not including operational subsidies and thus relating to the purely farm financial performance, the effect of management is overtaken by the significant effect of size and farms' liquidity. These findings support the premise that size and liquidity increase the company value and explain farms' financial performance more than ownership, which is predicted by theories that use an innovation oriented, dynamic and path-dependent approach to explain firm performance (Ekeland 2002). In Model 6, the overall indebtedness of the company is also found to have a negative impact on profitability.

Despite these unstable results and low evidence of the ownership effect on performance, we can learn a lot from analyzing the structure of the performance, ownership and ownership development variables using multivariate data analysis methods. The ownership forms as defined by variables in the performance model can occur in farms in sub-categories or their combinations and thus influence performance in various ways that would not be detectable by the above-presented model. We carried out a principal component and K-means cluster analysis on variables described in section 4 and

derived the farm groups described below. The objective of the component analysis is not only to find the relationship between ownership and performance variables without a causality setting, but also to detect a smaller number of composite variables which would represent the original variables, thereby allowing the next multivariate technique, cluster analysis, to be made more parsimonious. First, a description of the principal component analysis follows.

We use 166 observations for the component analysis, where the number of observations varies for respective variables due to missing values, but is not lower than 124. In general, the component factor analysis transforms the correlation matrix, in our case a non-parametric Kendall's tau correlation matrix, through the estimation of factor models into a factor matrix. We examine the empirical adequacy of the chosen variables for factor analysis on the individual and overall basis using measures of sampling adequacy (MSA) derived from mutual correlations between variables. We omitted variables whose individual MSA was lower than 0.5. This criterion thus determined the elimination of variables for investment activity from the analysis. The Kaiser-Meyer-Olkin MSA gives the value of 0.68, which meets the necessary threshold for sampling adequacy (minimum 0.50). Another criterion for variable inclusion are communalities of a value of at least 0.5, which gives the sum of squared factor loadings and indicates that the estimated factors explain at least 50% of the variance of each variable. Also, higher factor loadings of one variable in a number of factors is inconvenient for the factoring and result interpretation. Due to this, the variable SIZE was omitted from the analysis. To determine the number of factors which group mutually-correlated variables, we use the Latent root criterion, which suggests retaining those factors whose eigenvalue (unity variance) exceeds value 1. This indicates that each factor explains at least the variance of one variable. This criterion derived seven factors with an explanatory power of 12.1 variables, implying that they explain 63.9 % of the total variance of the 19 variables. The index for this solution is thus high and the variables are in fact highly related to one another. The interpretation of the unrotated factor matrix is, in general, extremely difficult and theoretically less meaningful. Therefore, we proceed to the factor matrix rotation which simplifies the interpretation. Orthogonal Varimax rotation provides uncorrelated factors. Table 2 includes variables in groupings determined by factor loadings higher than 0.5 and the factors' labelling and description.

Results from the principal component analysis in Table 2 indicate that the 19 variables pertain to seven distinct dimensions. Within the first dimension, factor 1, there is the trade-off between the cooperative legal form, intention to decrease the number of owners, company age and degree of depreciation. The high degree of common variance between these variables suggest that significant share of cooperative legal form of agricultural companies is likely to be established in the early years of transition. These companies are simultaneously assigned by high capital depreciation and an intention to decrease the number of owners in the upcoming three to five years. These characteristics suggest that factor 1 groups variables describing the degree of companies' reorganization.

The variables' grouping in factor 2 implies that ownership concentration expressed as the size of proportionate ownership, overall indebtedness and the share of debts from liabilities to eligible persons to their transformation and restitution claims are highly mutually correlated. However, it is important to note that the higher the debts the lower ownership concentration. Factor 3 suggests that there is further a trade-off between share of external owners and the style of decision making in the company. The higher share of external owners on total number of owners the more likely has the company switched to a different that one vote one member (shareholder) voting system. Factor 4 groups two profitability measures.

TABLE 2 Descriptions of Factors From Principal Component Analysis of Ownership Structure, Development and Performance Variables

Fa.	Variable	F. load.	Factor labeling and description
1	OWNDECR	0.767	**Degree of reorganization** – Factor 1 positively correlates with the cooperative legal form of a company, company's intention to decrease the number of owners, company's age, and degree of capital depreciation.
	COOPS	0.747	
	COMPAGE	0.741	
	DEPREC	0.558	
2	DEBT	0.717	**Ownership concentration** – Factor 2 positively correlates with ownership concentration and negatively correlates with the degree of overall indebtedness and indebtedness from transformation.
	CAPCONC	-0.712	
	TRANSFDEBT	0.683	
3	EXTEROWN	-0.719	**Investor ownership** – Factor 3 negatively correlates with the degree of external ownership and positively correlates with the voting system which preserves the one owner.
	VOTING	0.550	
4	PROFIT1	0.890	**Profitability** – Factor 4 positively correlates with Returns on Assets when calculated from Gross Farm Surplus and Returns on Assets when calculated from Gross Farm Surplus not including operational subsidies.
	PROFIT2	0.886	
5	MANOWNDISP	0.750	**Owners-managers-workers relationship** – Factor 5 positively correlates with variables for interests differences between managers and owners and for problems of workers' working moral, and negatively correlates with owners' engagement in companies operation.
	OWNENGAGM	-0.738	
	MORALPROB	0.613	
6	OWNMANSH	0.712	**Employee ownership –** Factor 6 positively correlates with the share of owners among managers and the share of employed owners on the total number of employees (employee ownership), and negatively correlates with the variable for partition of the former company.
	EMPLOWN	0.640	
	PART	-0.606	
7	CREDDEBT	0.754	**Managerial ownership** – Factor 7 positively correlates with the degree of credit indebtedness and negatively correlates with managerial ownership.
	MANOWN	-0.622	

The principal component analysis further disclosed that the higher interest differences between owners and managers the lower owners' engagement in the companies' operation and the larger problems with workers' working moral. This mutual relation is presented on factor 5. The causality in this relationship remains unclear. It could be the owners' and simultaneously workers' low interest in the company' maintenance, which causes the owners' and managers' interest differences. Factor 6 is highly correlated with the share of owners among managers and the share of employed owners on the total number of employees (employee ownership), and the partition of the former company. It suggests that companies with higher share of employee ownership, i.e. which hire less external labor are more likely be managed by owners and are companies which retained their original pre-transition size. Factor 7 implies that companies where managers have larger proportionate ownership are more likely to have lower share of credit debts. This evokes many questions which could only speculatively be answered in this point.

We computed factor scores from the variable standardized values and their factor loadings to the factors. These factor scores are further used in K-means cluster analysis[1]. The main objective of the cluster analysis is to detect distinct groups of similar enterprises with respect to their ownership form and performance. Cluster analysis is used to discover structure in the data without imposing any causality. It is not a tool for statistical significance testing; it is an exploratory data analysis which uses a clustering algorithm that puts objects into clusters according to well-defined similarity rules (StatSoft 1984-2004). The K-mean cluster analysis, which is more relevant for larger samples of observations (above 100) and allows a pair-wise exclusion of missing values, starts with *k* random clusters pre-determined by the researcher, and then moves objects between those clusters with the aim

[1] The variables INVACT for investment activity and SIZE, which were omitted from the factor analysis, could be taken in the cluster analysis. However, this is not followed since they correlate with a number of derived factor scores.

to (a) minimize variability within clusters and (2) maximize variability between clusters and thus get the most significant ANOVA results.

The cluster analysis determined the best solution for five clusters; $k = 5$ (see Table 3). The scores for factor 7 was excluded from the analysis since it did not classify well the differences between observations. To interpret the results, we examine first the means for each cluster on each variable to assess in which variables and how distinct the detected farm groups are. In table 3, we indicate with a sign only these variables in which the groups of enterprises vary markedly, in other words, in which the clusters' means are distinctly different from zero[2]. The signs imply in which variables are clusters different and in which they are similar. For example, cluster 1 and cluster 3 are similar with respect to the ownership concentration and the share of investor ownership, but these characteristics distinguish them significantly form enterprises in cluster 2 and cluster 4.

TABLE 3 Cluster differences identified by K-means cluster analysis

Classifying variables	Cluster 1 (22 farms)	Cluster 2 (52 farms)	Cluster 3 (36 farms)	Cluster 4 (14 farms)	Cluster 5 (42 farms)
Degree of reorganization	-	+	-	+	-
Ownership concentration	-	+	-	+	-
Investor ownership	-	+	-	+	
Profitability	+	+	-	-	
Owners-managers-workers relationship	-			+	+
Employee ownership	-				

To analyze the clusters in more detail, we have a closer look at the means of the original variables in the important factors and of other variables of interest. These are presented in Table 4.

Cluster 1 groups mostly Limited liability companies with on average 7 owners and highly concentrated ownership. With 41 workers and 1,200 ha, these companies belong to the smaller legal entities. Their ownership structure is such that, compare to other companies, they have a lower share of external owners. On the other hand they hire a significantly higher share of external labor, which is expected with such a small number of owners. The decision-making system is mostly one vote one shareholder, which might be in the case of each owner's high share an important principle. It is important to point out that, among these companies, it is very rare that managers own higher shares that other owners. This clustering supports in section 2 discussed observation that the establishment of Limited liability companies was often initiated by former collective or state farms managers, who approached the largest restituents to jointly establish a company. With respect to the internal organization, the number of workers per manager is significantly lower than in other companies which might improve the effectiveness of workers monitoring. The performance indicators - profitability, labor productivity as well as investment activity - imply that this group of companies is doing markedly better that any other companies' group. Since the ownership concentration seems to result in improved owners' incentive structure, reduction of decision-making as well as organizational costs, it is expected to play a major role in this economic success.

[2] Cluster analysis uses variables' standardized values, thus zero indicates the sample mean.

TABLE 4 Cluster means

Classifying variables	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Degree of reorganization					
- Legal form	77% LLT	81% JSC	94% Coops	93% JSC	98% Coops
- Share of enterprises intending to decrease the number of owners	5%	27%	81%	29%	88%
- Company age in 2003	11 years	7 years	12 years	7 years	12 years
- Size (revenues, land, workers)	83 mil CZK 1200 ha 41 workers	207 mil CZK 2000 ha 98 workers	142 mil CZK 1450 ha 58 workers	125 mil CZK 1500 ha 52 workers	171 mil CZK 1800 ha 79 workers
- Share of enterprises established from a part of former company	95%	57%	74%	79%	65%
- Share of enterprises with one vote one shareholder voting system	86%	10%	78%	0%	48%
Ownership concentration					
- Capital stock per owner (CZK)	221,000	316,000	78,000	274,000	128,000
- Shareholders' capital per owner	2,032,000	307,000	-43,000	251,000	255,000
- Number of owners	7	510	180	440	280
- Indebtedness (DEBT)	85%	30%	75%	28%	50%
Investor ownership					
- Share of external owners on total number of owners	20	84	66	82	75
Employee ownership					
- Share of employed owners on total number of employees	15	66	51	64	61
Managerial ownership					
- Share of enterprises with larger managerial ownership shares	16% of enterprises	40% of enterprises	21% of enterprises	36% of enterprises	30% of enterprises
Profitability					
- Return on Assets (PROFIT 1)	7.1	6.2	2.3	-0.6	6.1
Labor productivity					
- Total revenues / total work hours	457 CZK	432 CZK	352 CZK	340 CZK	402 CZK
Owners-managers-workers interest differences	Low			High	High
Investment activity					
- Share of the value of investment in 2001-03 on tot. asset value in 2003	11.7%	10.8%	6.9%	5.4%	7.2%
- Depreciation rate	50%	34%	56%	42%	53%

Cluster 2 and Cluster 4 classify companies with similar ownership structures. They are mostly Joint stock companies which were established later in transition; in the second wave of transformation of agricultural cooperatives. They are also similar with respect to their average share size, which is significantly lower that in companies in cluster 1, however, higher than in companies in cluster 3 and 4. Compare to other groups, the cluster 2 and 4 also include higher share of companies with higher managerial ownership shares. This would suggest that transforming to JSC allowed interested managers to acquire higher ownership shares. They are also marked with lower indebtedness which corresponds with the praxis of capitalizing transformation liabilities to eligible persons to the company assets (transformation claims) through changing legal form to JSC, i.e. turning liabilities into ownership shares. This corresponds to the high share of external owners. However, these two groups of enterprises significantly vary in their performance indicators, therefore, it is especially interesting to analyze their differences. First, companies in cluster 2 and 4 markedly differ in their size. The better performing companies in group 2 are assigned by larger size, but also by the fact that high share of these companies retained their original pre-transition form (they were not partitioned). The companies in group 4 were mostly parts of the original companies, which could suggest that the "new" owners were not interested in retaining the original enterprise. This could be conformed by the high interest

differences between owners and managers and be especially a case, if the company did previously not perform well. The higher depreciation rate in these companies compared to companies in cluster 2 could relate to the owners lesser interest to invest and/or to the fact that better capital was segregated. The differences between cluster 2 and 4 suggest that previous (pre-transition) performance is not as important for the development of the legal and organizational form of a company as it is important for its now-a-days economic performance. This is because good former performance, i.e. quality of the former management, can contribute to new owners' interests to support the management in strategic decisions and lower decision-making costs. On the other hand, information asymmetries and low market value of new owners shares allow even less-well performing companies and their management to achieve their strategic goals, e.g. change of their legal form. Their development is, however, burdened by lacking owners' incentives and the conflict of interests. Acquiring higher ownership shares and changing voting system in such way that it reflex the share size seems to be the managers strategy to gain decision-making flexibility and to reduce agency costs.

Cluster 3 and cluster 5 also provide some similarities in their organizational and ownership structures. The significant majority of the companies have a cooperative legal form. Their year of official establishment suggests that they are successors of former cooperatives or their parts (especially cluster 3). These mostly cooperatives are assigned by lower average ownership shares than are companies in other clusters. This could explain their intention to decrease the number of owners in the next three to five years and suggest their still relatively early stage of transformation. Comparing the two clusters, these arguments are even more relevant for cluster 3 than cluster 5. Companies in cluster 3 are still lacking in their reorganization behind companies in cluster 5. The average share in companies of cluster 3 is smaller than in companies of cluster 5 and markedly higher share of companies in cluster 3 retained the one vote one member voting system. The higher capital depreciation rate and smaller size of companies in cluster 3 indicate that companies in cluster 4 were more successful in preventing partition and segregation of their better assets through restitutions or giving over property to persons eligible to transformation claims. Similarly to clusters 2 and 4, also here, the intuition is that only companies with better and trustworthy management (formally better performing companies) could retain their assets. This argumentation is supported by performance indicators in Table 4, but also with the average manager age and education comparison between the clusters 3 and 5[3].

Important to note is also that cooperatives in cluster 5 perform better than JSC in cluster 4. This predicates that existing legal and organizational forms are still partially a result of intentions, social concerns and personalities of people in decisive positions with superior bargaining powers. The comparison of ownership forms, performance of other companies characteristics also suggest that, in general, management strives to maintain companies' original size. However, better performing companies rather succeed in this objective.

6 CONCLUSION

In this paper we analyzed the relationship between large-scale farm ownership structures and the farms' economic performance in the case of Czech agriculture. We aimed to identify the structure in large-scale farms' characteristics which could explain the often- presented ambiguous empirical results regarding large-scale farms' economic performance. We first used a conventional approach to analyze the ownership form effect on performance. As performance indicators, we used often applied profitability measures, but also measured labor productivity. By means of instrumental variables in the performance regression model, we controlled for possible ownership endogeneity. Exploratory data analyses were used to identify the combination of ownership characteristics and performance indicators in heterogeneous groups of similar large-scale farms.

[3] The differences are not significant. The average director age in cluster 3 is 47.6 while in cluster 5, it is 47.3 years. In remaining groups varies the group average director age between 45.8 to 47.1. Similar results hold for education.

We found large heterogeneity in the ownership structures of Czech agricultural companies. Statistical tests revealed that the analysis of ownership effect on economic performance can be significantly influenced by the problem of ownership endogeneity. Estimations of nine analogous performance models controlling for this endogeneity problem disclosed no significant influence of ownership on performance in most cases; the estimates rather suggested that these two variables have common factors. However, these results are partially ambiguous. In two models, the effect of managerial ownership proved to be significant, but nevertheless indicated contrary directions. The results suggest that managers owning higher equity shares improves the labor productivity of the farm, while also significantly decreases its financial performance. As more detailed analysis implies, the former could be the result of an improved decision-making system, and the latter the result of the higher share of settled transformation debts. In one model, capital concentration was also found to positively influence labor productivity. In three models, age of the director and other management members was found to be significant. Three other models explaining profitability imply a significant effect of size and farms' liquidity. These findings support the theoretical arguments that size and liquidity increase the companies' value and explain farms' financial performance more than ownership. This is usually predicted by theories that use an innovation-oriented, dynamic and path-dependent approach to explain firm performance (Ekeland 2002). Nevertheless, the sensitivity of the ownership effect results from the performance measures makes the derivation of general conclusion difficult. The result suggest that profitability derived from farms' accounting is not a very effective measure of performance since investment activity and strategy chosen with respect to settling transformation debts could influence the company value that is not well captured by the accounting. In future research, more exact and comprehensive measures of farm performance should be found.

Applying cluster analysis in the second stage of the analysis, we detected five groups of large-scale farms. The results of the farm groups comparison suggest that higher performance is (a) related to lower principal-agent problems, which could be a result of improved ownership structure through the reduction of number of owners, increased ownership concentration and higher managerial ownership, but also (b) pre-determines the ownership structure transformation. The choice of ownership structure, similar to company performance, seems, assuming managers' high bargaining power, to reflect management quality or social concerns. Furthermore, we found that analogical ownership structures, and especially legal forms, can relate to economic successes as well as failures. Deeper analysis of this issue suggests that the ownership structure-performance relationship depends on whether the ownership structure was a result of a business strategy or happened out of necessity. Ownership concentration and low investors' ownership can help to appraise the created value since decisions on investment and business strategies are done more easily. On the other hand, in companies with low inherited equity value, efficient ownership assigned by high concentration and low share of investors' ownership would be of less benefit than would be external investment into the company.

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NOTES

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[2] During the 1950's, the first wave of collectivization based on the principle "one village – one collective farm took place (500 – 600 ha). In the 1970's, the second wave of collectivization was based on the principle "more villages – one collective farm" (3,000 – 8,000 ha), which resulted in extremely large farm sizes (Doucha and Divila 2001). The state farms were founded and operated on non-inhabited land usually in border and mountainous region, land of farms that originally belonged to aristocratic families and the church, land of expropriated farmers with more than 50 hectares, on confiscated land which belongs to Germans and traitors who were send to Germany after the Second World War, and later on land that originally belonged to continuously non-prosperous collective farms (Majerová 2000, Chloupková 2001).

[3] Since the principal component analysis belongs to standard tools of data analysis and does not require concrete model specification, it will not be discussed in more detail in the paper. The only exceptional facet of our approach is the use of non-parametric Kendall's tau correlations for the

following component analysis, which is viewed as more appropriate for models including ordinal variables. The criteria for variable choice, number of components and other estimates of quality characteristics will be discussed in the results section. We further apply K-means cluster analysis on factoral scores obtained by the component analysis for classifying homogeneous enterprises into from each other different groups.

[4] Gross Farm Surplus is equal to Gross Value Added from the production and sale of goods plus (select) operational subsidies less labour costs and taxes linked to production, and represents the funds (resources) that the farm has at its disposal to face its past and current financial commitments and to invest in the future. Gross Value Added from production and sales is equal to total production (revenues from own agricultural and non-agricultural products and service, plus change in inventory of own products, plus capitalization) minus production consumption (consumption of material and energy plus services) plus revenues from sold goods, minus expenses on sold goods.

[5] Operational subsidies are direct commodity payments plus less favored area (LFA) payments plus agro-environmental payments.